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AUTHOR Karmel, Tom
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ABSTRACT

Data from Australia's Department of Employment, Education and Training were analyzed to determine the relationship between the costs and returns of secondary education in Australia. The analysis focused on changes in the following: the earnings premium from having a level of educational attainment equivalent to completing at least secondary school; the demand for employees who left school before graduation; full-time employment opportunities for teenagers; and the income support available to young people who stay in school. The earnings premium from having a level of educational attainment equivalent to completing at least secondary school was found to have increased in the 1980s after having declined in the 1970s. Changes in occupational structure and increases in the labor force participation of workers beyond their teens have substantially reduced the number of full-time jobs available for teenagers. Two other factors have also likely helped to more than double the rate of student retention in the final year (year 12) of secondary education since the early the 1980s: a long-term increase in the proportion of schoolchildren in part-time employment and substantial increases in government allowances for students who stay in school. (Thirteen tables/figures are included. Contains 50 references.) (MN)

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ED 413 510

WORKING PAPER NO. 3

THE DEMAND FOR SECONDARY SCHOOLING

Tom Karmel
March 1996

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Phone: (03) 9905 2808 or Fax: 03 9905 9184
email: fran.ferrier@education.monash.edu.au

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MONASH UNIVERSITY
Faculty of Education, Clayton Victoria Australia 3168 Telephone: (03) 9905 9157 Facsimile: (03) 9905 9184

The Demand for Secondary Schooling

Tom Karmel
Australian National University

The most striking change in educational participation has occurred in the later years of secondary schooling. The year 12 retention rate has more than doubled since the beginning of the 1980s. Changes in participation in secondary schooling are of particular interest because they can be attributed almost totally to a change in the demand for education. Unlike the supply of places at tertiary institutions the supply of secondary schooling can be taken to be perfectly elastic.[1]

Economic theory suggests that the demand for secondary schooling depends on the returns from undertaking schooling relative to the costs. Simple human capital models argue that individuals choose their level of schooling in order to maximise the net present value of earnings. In a world of full employment the returns are calculated simply from average wages of individuals with different levels of education while the costs depend on direct costs of education plus the value of forgone earnings.

The world is rather more complicated in practice. First, wages depend on other factors than the level of schooling; ability and on the job training, for example. Second, there is no guarantee of a job because labour markets do not always clear. Hence, the probability of obtaining a job should enter the rate of return calculations.

The factors entering the cost side of the decision are equally complicated. The direct costs depend upon the school an individual chooses. The indirect cost to an individual depends upon a range of factors including the difficulty of obtaining a job rather than staying at school, the level of income support available from the Government, the possibility of working part-time, the level of parental support and the consumption value of the education.[2]

We also argue that individuals do not necessarily choose an optimal level of schooling at the outset of schooling. Rather, decisions are often made sequentially. For example, the decision to stay until year 12 is contingent upon having stayed at school to year 11. In addition, expected returns from staying to year 12 do not just depend on the earnings of those with year 12 compared to those with year 11. Since earnings depend on post-school qualifications as well as the level of secondary schooling the decision to stay to year 12 must incorporate the expected return from post-school study together with the probability of the individual undertaking that post-school study.

The approach that we take in this paper is to see the extent to which changes in school retention are related to factors which are likely to affect costs and returns. The first

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[1]The supply of places at government schools is perfectly elastic because the government guarantees a place to any young person wishing to complete secondary school. Of course, the types of schooling may change, making it more or less attractive for students to stay at school.

[2]This discussion has been couched in terms of an individual choosing whether to stay at school. In practice, parents have a large, if not dominant, influence on this decision. This does not change the argument; presumably, parents are interested in the welfare of their children.

section looks at ways in which the demand for secondary schooling can be measured. We choose to focus on grade progression rates which are likely to capture the sequential nature of the decision making process.

In the second section we look at changes in the returns from staying at school by considering movements in relative earnings. We find that the earnings premium from having a level of educational attainment equivalent to completing school or higher increased in the 1980s after declining in the 1970s. Estimates of shifts in demand, based on the movements of relative earnings, suggest that the demand for persons who were early school leavers fell very substantially in the 1970s and 1980s.

We then turn to full-time employment opportunities for teenagers (Section 3). Changes in occupational structure and increases in the labour force participation of some other age groups appear to have had a substantial impact on the number of full-time jobs available for teenagers.

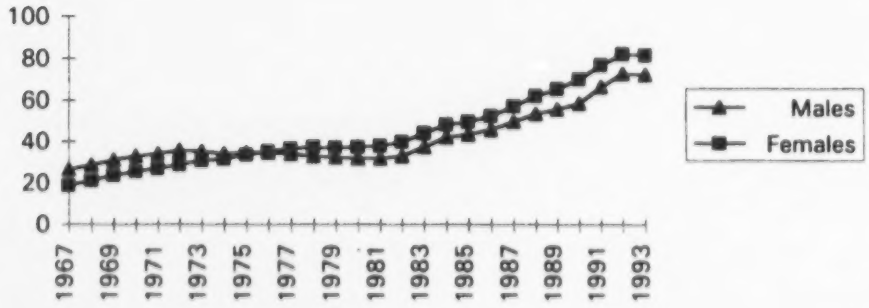
In Section 4 we look at movements in the income support available to young persons who stay at school. There has been a long term increase in the proportion of school children in part-time work, along with substantial increases in government allowances from the mid 1980s. It is argued that both of these may have played a part in increasing school retention by reducing the costs of schooling.

Section 5 reports the results of a regression analysis which brings together the factors considered earlier.

Measuring the demand for schooling

Most attention has been focused on apparent year 12 retention. This has shown a dramatic increase since the early 1980s (Figure 1).

Figure 1: Apparent year 12 retention rate (per cent)

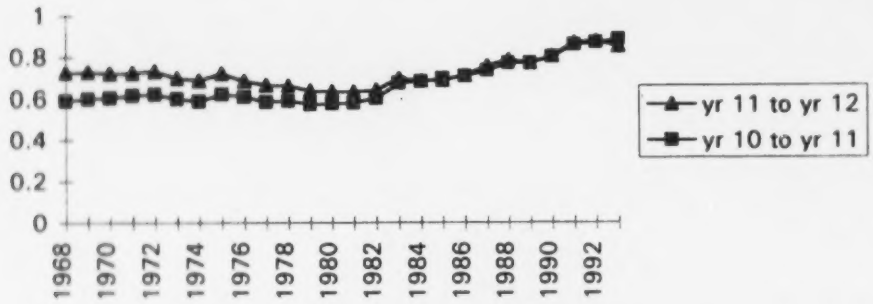


Source: Department of Employment, Education and Training (1993) and supplement (1994)

There are a number of other possible measures including age participation and grade progression rates. The measures that we use are apparent grade progression rates from

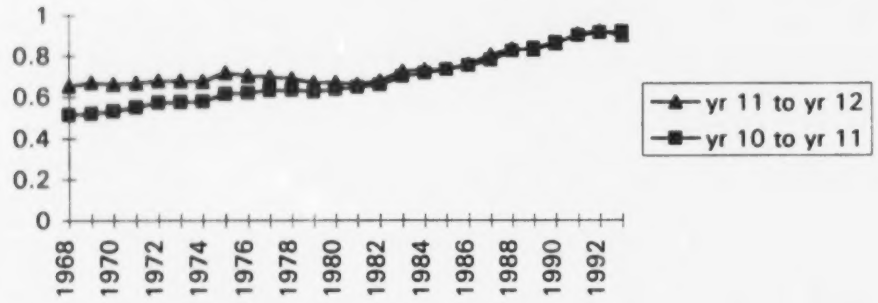
year 10 to year 11 and from year 11 to year 12 (Figures 2 and 3).[3] The justification for these is that they better capture the nature of the decision making process.[4]

Figure 2: Apparent grade progression rates, males



Source: Department of Employment, Education and Training (1993) and supplement (1994)

Figure 3: Apparent grade progression rates, females



Source: Department of Employment, Education and Training (1993) and supplement (1994)

The interesting feature of Figures 2 and 3 is that the progression rates from year 10 to year 11 differ considerably in the late 1960s but have come together by the early 1980s. The other point of interest is that the female rates have caught up to and passed the male rates.

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[3]The grade progression rate from year 10 to year 11 is calculated by dividing the apparent retention rate to year 11 by the apparent retention rate to year 10 in the previous year. The apparent retention rates are based on data from the annual schools census, published by the Department of Employment, Education and Training. Alternative progression rates can be calculated from data from the Labour Force Survey (Australian Bureau of Statistics, Cat. No. 6203.0) by dividing, for example, the number of 18 year olds at school one year by the number of 17 year olds the year before. Series calculated in this fashion exhibit more noise than the progression rates based on the schools census data.

[4]Forster and Ryan (1986) argue that participation rates are less than satisfactory because they reflect both current and past schooling decisions.

Changes in the return from staying at school

Changes to relative earnings

In Table 1 we present average annual earnings (full-time, full-year workers) for males and females, relative to an individual leaving school at 14 or 15 which, broadly speaking, can be taken to correspond to leaving at year 10. Table 2 presents analogous data relative to an individual leaving school at 16 years.

For both males and females, there was some decline in the return to continuing education relative to leaving school at the age of 14 or 15 between 1968-69 and 1981-82.[5] Subsequently, the return increased so that the return over the later 1980s was similar to that for the 1970s. A similar pattern is seen in Table 2 for the return relative to leaving school aged 16.

Table 1: Average earnings of full-time, full-year workers relative to an individual leaving school at 14 or 15, assuming continuation in education

	68-69	73-74	78-79	81-82	85-86	89-90
Males						
At age 15-24	1.18	1.16	1.25	1.17	1.18	1.24
At age 25-34	1.29	1.23	1.16	1.16	1.17	1.19
At age 35-44	1.35	1.33	1.28	1.23	1.26	1.31
At age 45-54	1.39	1.28	1.28	1.25	1.30	1.33
At age 55+	1.39	1.29	1.34	1.23	1.48	1.30
All ages	1.30	1.24	1.23	1.19	1.24	1.25
Females						
At age 15-24	1.24	1.20	1.19	1.18	1.23	1.22
At age 25-34	1.20	1.31	1.26	1.18	1.28	1.29
At age 35-44	1.41	1.30	1.32	1.29	1.35	1.33
At age 45-54	1.26	1.34	1.23	1.16	1.35	1.39
At age 55+	1.51	1.24	1.39	1.38	1.46	1.16
All ages	1.25	1.23	1.23	1.19	1.27	1.26

Source: Australian Bureau of Statistics, Income Surveys

[5]Strictly speaking we are interested in the return from staying at school; some persons with tertiary qualifications may have left school at 14 or 15.

Table 2: Average earnings relative to an individual leaving school at 16, assuming continuation in education

	68-69	73-74	78-79	81-82	85-86	89-90
Males						
At age 15-24	1.31	1.27	1.25	1.26	1.30	1.32
At age 25-34	1.23	1.18	1.16	1.18	1.18	1.21
At age 35-44	1.21	1.21	1.18	1.19	1.14	1.18
At age 45-54	1.16	1.07	1.15	1.07	1.11	1.23
At age 55+	1.23	1.14	1.21	0.84	0.87	0.95
All ages	1.34	1.28	1.27	1.23	1.21	1.26
Females						
At age 15-24	1.26	1.17	1.15	1.23	1.14	1.14
At age 25-34	1.20	1.38	1.17	1.23	1.21	1.28
At age 35-44	1.14	1.31	1.21	1.30	1.29	1.19
At age 45-54	1.25	1.24	1.19	1.23	1.41	1.33
At age 55+	1.46	1.19	1.18	1.50	1.19	1.43
All ages	1.34	1.29	1.20	1.29	1.24	1.24

Source: Australian Bureau of Statistics, Income Surveys

Demand shifts

The stability of relative earnings in the face of large increases in educational levels suggest that they might mask large changes in labour demand. If labour demand shifts away from those with low levels of education then increases in school retention are to be expected. We model the demand for persons who did not complete school relative to those with higher levels of educational attainment, using the changes in relative earnings reported in Tables 1 and 2.

Following Katz and Murphy (1992) we estimate the demand shift between these two groups using the relationship

$$\hat{D} = \left(\frac{1}{1+\rho}\right)\left(\frac{\hat{w}_1}{\hat{w}_2}\right) + \frac{\hat{L}_1}{L_2} \qquad (1)$$

where $\hat{D}$ denotes the shift in labour demand between labour type *1* and labour type *2*, w_1/w_2 the relative earnings, L_1/L_2 the relative quantities of labour, $1/(1+\rho)$ the elasticity of substitution and ^ indicates percentage change.[6]

Estimates based on this methodology, using an elasticity of substitution of one, are reported in Table 3 for the entire period 1968-69 to 1989-90.[7] The left hand panel

[6]The relationship assumes that the economy can be characterized by a CES production function with multiple types of labour and that factor inputs are paid their marginal products.

[7]The results are not sensitive to the value taken by the elasticity of substitution.

decomposes changes in the average earnings of persons whose level of educational attainment is higher than 'left school at 14 or 15 years' relative to the earnings of persons whose highest level of educational attainment is 'left school at 14 or 15 years'. The right hand panel gives the analogous decomposition using 'left school at 16 years' as the benchmark.

Table 3: Decomposition of changes in demand, 1968-69 to 1989-90 (per cent)

	Education better than leaving school at 14 or 15 Change in (relative to leaving school at 14 or 15):			Education better than leaving school at 16 Change in (relative to leaving school at 16):		
	Earnings	Quantities	Residual demand	Earnings	Quantities	Residual demand
Males						
15-24 years	4.6	163.0	167.6	0.6	77.2	77.7
25-34 years	-7.9	159.3	151.4	-1.6	45.2	43.6
35-44 years	-2.7	158.7	156.2	-2.9	64.3	61.5
45-54 years	-4.5	115.5	111.0	5.8	61.3	67.2
55+ years	-6.2	85.2	79.0	-25.3	62.9	37.6
Total	-3.7	139.8	136.1	-6.5	68.1	61.5
Females						
15-24 years	-1.9	177.9	176.0	-10.1	139.4	129.3
25-34 years	7.1	215.6	222.7	5.9	94.8	100.7
35-44 years	-5.4	163.9	158.5	3.9	75.6	79.5
45-54 years	10.1	80.1	90.2	6.2	104.1	110.3
55+ years	-26.1	40.1	14.0	-2.1	118.6	116.5
Total	1.3	140.5	141.9	-7.2	123.1	115.9

Source: Australian Bureau of Statistics Income Surveys

A number of points emerge from this table. First, there has been a very substantial shift in demand toward persons who have completed school or have a post-school qualification. This shift in demand appears to be greatest among the younger age groups. Second, the group that has been particularly affected consists of persons who left school at 14 or 15. Third, the shifts are greater for women than for men.

To establish whether shifts in demand have affected school retention we need to compare the results of Table 3 with movements in the grade progressions rates. First, we would expect the year 10 to year 11 grade progression rates to have increased more than the grade 11 to grade 12 rates on the basis that the demand shifts have been most unfavourable to those who left school aged 14 or 15. Second, we would expect the grade progression rates for women to have increased more than for men. From Figures 2 and 3 it can be seen that both of these predictions are borne out by the grade progression rate series.

To make the case even more convincing we need to establish that the pattern over time observed for the demand shifts is related to the patterns observed for the grade progression rates. The demand shift estimates for the periods between the Income Surveys are presented in Table 4. We focus on the younger age groups which, we argue, are of more relevance to individuals deciding whether to continue in education.

While the estimates of shifts in demand jump around somewhat there does appear to be some pattern. The shifts appear to be strongest in the 1970s. By contrast the shifts are minor in the early 1980s before increasing for the rest of the decade. This pattern corresponds roughly to what we see for the grade progression rates for the female year 10 to year 11 grade progression rates but not for the other progression series. While there were minor declines around 1980 for the male progression rates and the female year 11 to year 12 rate, the major growth in the rates occurred in the 1980s rather than the 1970s.

We conclude that shifts in demand away from individuals who have not completed school may be an important factor behind the increase in school retention but that there is no obvious link between them. Additional factors are needed to explain the way in which the grade progression rates have changed over time.[8]

Table 4: Estimates of relative demand shifts, 1968-69 to 1989-90 (per cent)

	Changes in demand for persons with education better than left school at 14 or 15 compared to persons who left school at 14 or 15		Changes in demand for persons with education better than left school at 16 compared to persons who left school at 16	
	15-24 years	25-34 years	15-24 years	25-34 years
Males				
68-69 to 73-74	40.8	35.2	5.6	19.0
74-74 to 78-79	50.8	53.5	36.2	23.0
78-79 to 81-82	0.9	17.9	-3.4	-3.0
81-82 to 85-86	25.7	32.6	23.5	5.5
85-86 to 89-90	49.5	12.1	15.9	-0.9
68-69 to 89-90	167.7	151.4	77.7	43.6
Females				
68-69 to 73-74	53.6	52.8	52.7	28.7
74-74 to 78-79	37.1	58.9	47.3	34.9
78-79 to 81-82	26.7	15.3	8.9	-1.3
81-82 to 85-86	40.3	59.7	26.3	22.4
85-86 to 89-90	18.3	36.0	-6.0	16.0
68-69 to 89-90	176.0	222.7	129.3	100.7

Source: Australian Bureau of Statistics Income Surveys

[8]We also considered whether changes in relative probabilities of employment, which will affect the return to education, were a possible factor behind increases in school retention. Most variation in the relative probabilities of having a job is cyclical, although there is some evidence that changes in relativities may have provided increased incentives during the 1980s to stay on at school.

Teenage employment opportunities

In evaluating the value of education as an investment the most important cost is forgone earnings. Variations in average earnings of young persons could conceivably influence the decision to stay at school. However, in the Australian labour market availability of jobs has varied much more and is a much more plausible explanation for the increase in schooling. Certainly a popular conception has been that many teenagers are staying at school because of the difficulty of finding a job (Sweet, 1992).

Employment opportunities cannot be measured directly by looking at the number of teenagers in full-time jobs because the direction of causality is unclear. If teenagers stay at school longer then the reduction in the teenage labour supply will reduce the number of teenagers in-employment. Consequently we need to get some indicators of demand for teenage workers which are external to teenagers.

We first look at the occupational structure. If teenagers are concentrated in occupations which are declining in importance then this would suggest that the aggregate demand for teenage labour has fallen. To test this proposition we construct an 'occupational structure' index based on the 'structure effect' from standard shift-share analysis.

Let E_{ijt} be employment in the ith occupation, jth demographic group at time t and let $\cdot$ indicate a summation over the relevant subscript.

Ignoring the time subscript and denoting percentage change by ^ we have

$$\hat{E}_{\cdot j} = \sum_{i} w_{ij} \hat{E}_{ij} \text{ where } w_{ij} = E_{ij} / E_{\cdot j}. \tag{2}$$

$$\text{Now } E_{ij} = \left(\frac{E_{ij}}{E_{i\cdot}}\right)\left(\frac{E_{i\cdot}}{E}\right)E \tag{3}$$

$$\text{and so } \hat{E}_{ij} = \hat{v}_{ij} + \hat{s}_{i\cdot} + \hat{E} \tag{4}$$

$$\text{where } v_{ij} = E_{ij} / E_{i\cdot} \text{ and } s_{i\cdot} = E_{i\cdot} / E.$$

$$\text{Hence } \hat{E}_{\cdot j} = \sum_{i} w_{ij} \hat{v}_{ij} + \sum_{i} w_{ij} \hat{s}_{i\cdot} + \hat{E}. \tag{5}$$

The second term of (5) is commonly termed the structure effect. It represents growth in employment which can be attributed to changes in the occupational structure. Abstracting from the share of employment held by teenagers within occupations and

overall employment growth we have $\hat{E}_j^{occ} = \sum_i w_{ij}\hat{s}_i$ where the superscript *occ* denotes the occupational structure effect. If we take percentage changes from a base year we can write

$$\hat{E}_j^{occ} = \sum_i w_{ij}\left(\frac{E_{it}}{E_t} - \frac{E_{it_0}}{E_{t_0}}\right) / \left(\frac{E_{it_0}}{E_{t_0}}\right) \tag{6}$$

Rearranging terms we obtain

$$\hat{E}_j^{occ} + 1 = \sum_i w_{ij}\left(\frac{E_{it}}{E_t}\right) / \left(\frac{E_{it_0}}{E_{t_0}}\right) \tag{7}$$

This defines our index. That is

$$I_{jt}^{occ} = \sum_i w_{ij}\left(\frac{E_{it}}{E_t}\right) / \left(\frac{E_{it_0}}{E_{t_0}}\right) \tag{8}$$

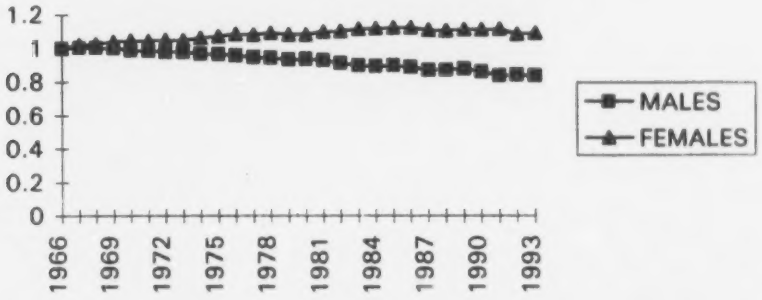
The weights w_{ij} are calculated at some base period t_0. It can be seen that the index will rise if employment of the group is concentrated in growing occupations.

The index[9] is presented in Figure 4, based on weights for 15-19 year olds.[10]

[9]Data limitations dictate the level at which the index can be calculated. Prior to 1986 it is based upon the CCLO classification at the major group level, with weights defined in 1978. After 1986 it is calculated at the major group level of the ASCO classification, with weights defined in 1986. The two parts of the index are linked by imputing CCLO based estimates for August 1986 by applying the growth rates at the major group level between May 1986 and May 1985 to the August 1985 levels, and forcing the total full-time employment to add to the actual full-time employment of August 1986. The index was also calculated at the minor group level from 1986 to 1993 with similar results, although the movements between minor occupations within the major groups tended, if anything, not to favour teenagers. For males the minor group index fell from 1.00 to 0.94 over the period 1986 to 1993, with an identical change at the major group level. For females, the minor group index fell from 1.00 to 0.94 compared to 1.00 to 0.97 for the major group.

[10]Weights based on the distribution of 16-17 year old employment gave similar results to the 15-19 year olds.

Figure 4: Effect of changes in occupational structure on teenage full-time job opportunities



Source: Australian Bureau of Statistics, The Labour Force, Australia

For teenage males there has been a steady decline in the index beginning in the early 1970s. The stability of the decline suggests that this type of structural change does not provide a complete explanation for the rapid increase in school retention in the 1980s, although it is likely that it has been a factor making school relatively attractive compared to the workforce. By contrast, occupational change has generally favoured teenage females, although trends since the late 1980s have not been favourable. Occupational change does not appear to offer an explanation for the increase in retention among females.

Cohort size

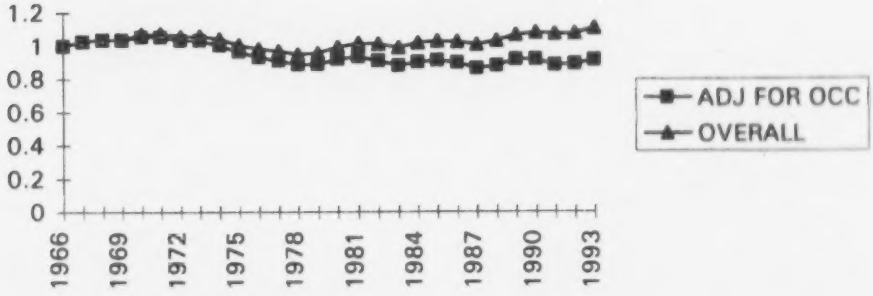
One limitation of the above index is that it does not take into account the rate at which the teenage population has changed. Members of large cohorts may have difficulty finding a job relative to members of small cohorts (Wachter and Wascher, 1984, 1991). It has also been argued that cohort size will affect educational choice through its impact on the rate of return to education (for example, Dooley and Gottschalk, 1984; Alsalam, 1985a; Stapleton and Young, 1988; Falaris and Peters, 1991, 1992; Flinn, 1993).[11]

We look at the changes in the teenage population relative to the growth in full-time employment. It can also be argued that overall employment growth is not the appropriate yardstick if that growth has occurred among occupations with few teenagers. Consequently, we make the comparisons both ignoring and accounting for occupational change.

Our method of comparison is based on the shift share structure outlined earlier. The third term of (4) can be interpreted as the growth in employment of the jth group due to overall employment growth. Similarly the sum of the second and third terms represents growth in employment opportunities due to overall employment growth together with changes in occupational structure. We compare changes in cohort size in Figures 5 and 6. A decline in the index indicates that the 15 to 19 year old population is increasing faster than total employment.

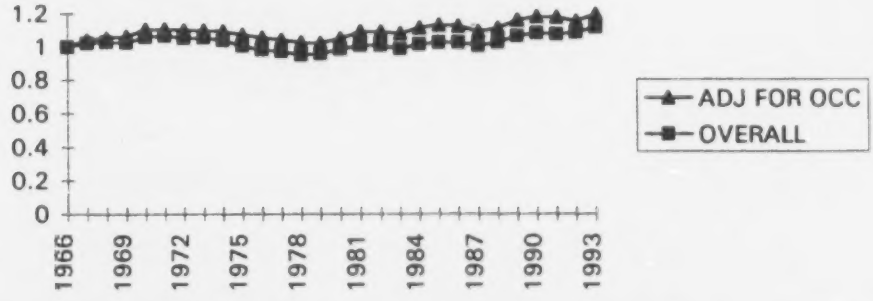
[11]There is an extensive literature on the effect of cohort size on earnings (for example, Freeman, 1979; Welch, 1979; Berger, 1983, 1985,1989; Dooley and Gottschalk, 1984; Alsalam, 1985b; Connelly, 1986; Bloom, Freeman and Korenman, 1987; Ermisch, 1988).

Figure 5: Movements in cohort size relative to full-time employment, males



Source: Australian Bureau of Statistics, Population Estimates, The Labour Force, Australia

Figure 6: Movements in cohort size relative to full-time employment, females



Source: Australian Bureau of Statistics, Population Estimates, The Labour Force, Australia

These comparisons suggest that changes in cohort size together with long term trends in full-time employment are substantial enough to have had some effect on school participation. Employment opportunities for males, as measured by the index which takes into account changes in occupational structure, declined steadily over the 1970s and fluctuated at around a low level for the 1980s and early 1990s. This pattern does not correspond to changes in school continuation rates. For females, there is a less marked decline in the index (adjusted for changes in occupational structure) over the 1970s and the index recovers over the 1980s. This pattern does not appear to correspond to the pattern of school participation for females and, certainly, does not explain why female school progression rates increased to higher levels than the male rates.[12]

Supply pressures from other groups

It has been argued (Bureau of Labour Market Research, 1987, for example) that labour supply factors have been more important than changes in the structure of employment. If this is the case, then movements in the labour supply of demographic groups which compete for jobs with teenagers may affect employment prospects of teenagers more than changes in occupational structure. We examine this argument by looking at the

[12]In the regression analysis in Section 3.5 we test the direct effect of cohort size as well as allowing for its effect through a teenage employment opportunity index.

relative movements in the full-time labour force of demographic groups, taking into account the occupational concentration of the groups. An index is constructed which compares the growth in the labour force of demographic groups other than teenagers with the population growth of 15-19 year olds, allowing for differences in the distribution of different groups across occupations. The derivation of the index is as follows.

As before, let E_{ijt} be employment in the *i*th occupation, *j*th demographic group at time *t* and let . indicate a summation over the relevant subscript.

In each time period assume there will be E^*_{jt} persons in the *j*th demographic group competing for a job. The bid for jobs in a particular occupation depends on the traditional share of jobs held by the group in the occupation. The share of the jobs which the group will actually get will depend on the size of bids of all the groups. If a demographic group's labour force is growing relatively quickly then it would be expected that the demographic group would increase its share of jobs.

That is, the *j*th demographic group would hope to obtain $w_{ij}E^*_{jt}$ jobs in the *i*th occupation, where $w_{ij} = E_{ij} / E_{j}$ is the distribution of employment across occupations at some base period. Assuming that all groups are equally successful the total jobs obtained by the j'th demographic group would be

$$Jobs_{j't} = \sum_i \left(\frac{w_{ij} E^*_{j't}}{\sum_j w_{ij} E^*_{jt}} \right) E_{it} \qquad (9)$$

We rewrite E^*_{jt} as $E^*_{jt} = E_{jt_0}\Delta_{jt}$ where $\Delta_{jt} = LF_{jt} / LF_{jt_0}$ for groups other than teenagers and $\Delta_{jt} = N_{jt} / N_{jt_0}$ for teenagers, where *LF* represents the full-time labour force and *N* represents the population. Then $w_{ij}E^*_{jt} = E_{ijt_0}\Delta_{jt}$.

Expressing the jobs that the j'th demographic group could expect to get as a proportion of the corresponding population and dividing by the proportion of the j'th group in full-time jobs in the base period gives

$$C_{j'} = \left(\frac{1}{N_{j't}} \right) \left(\sum_i \left(\frac{E_{ij't_0}\Delta_{j't}}{\sum_j E_{ijt_0}\Delta_{jt}} \right) E_{it} \right) / \left(\frac{E_{j't_0}}{N_{j't_0}} \right) \qquad (10)$$

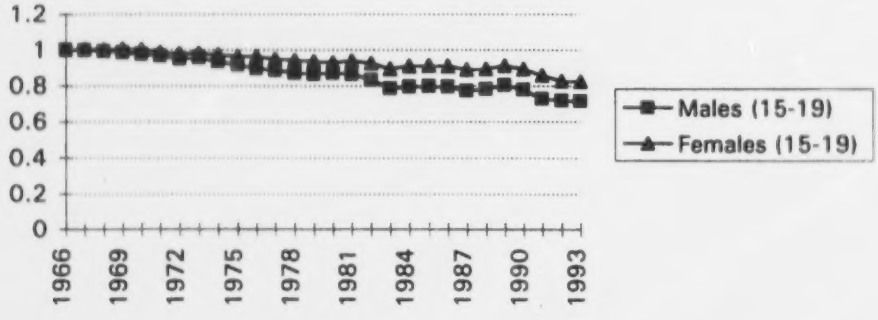
The structure of the index is best explained by rewriting it as

$$C_{j't} = \left(\frac{\tilde{E}_{j't}}{E_{j't_0}} \right) / \left(\frac{N_{j't}}{N_{j't_0}} \right) \text{ where } \tilde{E}_{j't} = \left(\sum_i \left(\frac{E_{ij't_0}\Delta_{j't}}{\sum_j E_{ijt_0}\Delta_{jt}} \right) E_{it} \right) \qquad (11)$$

$\tilde{E}_{j't}$ is the number of jobs the teenage group (denoted by j') can 'expect' to get at time t given employment growth by occupation and the increase in the full-time labour force of other demographic groups relative to the growth in the teenage population.

Figure 7 presents the index. It provides clear evidence of a very substantial decline in full-time employment opportunities for teenagers. Clearly, the labour forces of other demographic groups have grown faster than overall full-time employment, thus putting pressure on teenage job opportunities. The numerical importance of this factor has been large enough to offset the favourable occupational change which had been observed for females. The other feature of the index is its behaviour in the recessions of 1982-83 and the early 1990s. At each of these recessions the index declined. This is what would be expected but the interesting thing is that the index did not recover between the recessions. One possibility is that the job growth after the recession has drawn in persons from outside the labour force who have consequently reduced opportunities for teenagers. Thus teenagers are affected by both the recessions and shocks generated by the recessions.

Figure 7: Full-time employment opportunities for teenagers, taking into account changes in occupational structure and labour supply changes of other groups



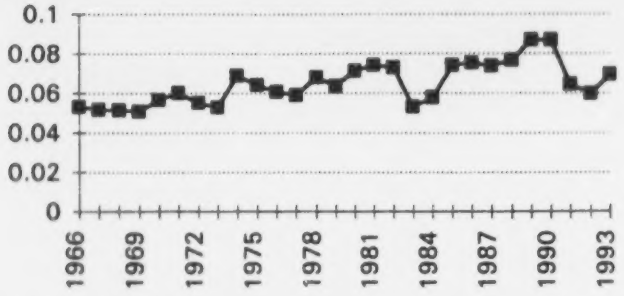
Source: Australian Bureau of Statistics, The Labour Force, Australia, Population Estimates.

Changes in the availability of apprenticeships

Apprenticeships have been an important alternative to the completion of school for many boys and a smaller number of girls. One possible reason behind the increase in school retention is a reduction in the availability of apprenticeships. To test this possibility, in Figure 8 we plot apprenticeship commencements as a proportion of the 15 to 19 year old male population.[13]

[13]It would be preferable to split apprenticeship commencements by gender. However, these data are not available in an extended time series. In 1992-93, 39 085 males and 7 005 females commenced apprenticeships (National Centre for Vocational Education Research Ltd, Annual Apprenticeship Statistics). .

Figure 8: Apprenticeship commencements as a proportion of 15-19 year old males



Source: Apprenticeship commencements supplied by the National Centre for Vocational Education Research Ltd

The main feature of the figure is the pronounced downturns that correspond to the recessions of 1982-83 and 1991-92. Apart from these downturns there are no longer term trends to suggest that the availability of apprenticeships has been a factor behind the increase in retention. Indeed, there was strong growth in apprenticeship commencements in the late 1980s, a period in which school retention increased substantially.

Cyclical factors

The majority of the discussion in this section has been couched in terms of longer-term structural factors that might impact on the employment opportunities.[14] Cyclical factors are also likely to be important. Certainly, it appears to be conventional wisdom that a reason behind the increase in retention has been high rates of unemployment. While the attractiveness of remaining in school will be higher when employment prospects are very poor (because expected forgone earnings will be low) a casual examination of the pattern of changes in school progression rates does not indicate any obvious cyclical pattern. School retention may have gone up in 1983 and the early 1990s when labour market prospects were very poor but it also increased in the late 1980s when labour market prospects were relatively strong. This suggests that cyclical factors have not influenced school retention in any simple way.

Income support

One factor which affects the decision to stay at school is the level of income support available for a student. Possible sources are support provided by government and the availability of part-time work.[15]

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[14]It should be noted that the employment opportunity indexes discussed above incorporate cyclical factors to the extent that the business cycle affects growth in overall employment, the occupational structure and labour force participation.

[15]The level of parental support is also likely to be important. Following Pissarides (1981) we looked at the growth of permanent income, measured by real per capita private consumption expenditure. The growth in this variable has been steady apart from cyclical slowdowns and in no way explains the rapid increases in retention which occurred in the 1980s but not the 1970s. McGavin (1982) uses real average weekly adult male earnings as a measure of the resources available to families. This ignores the contribution of female earnings.

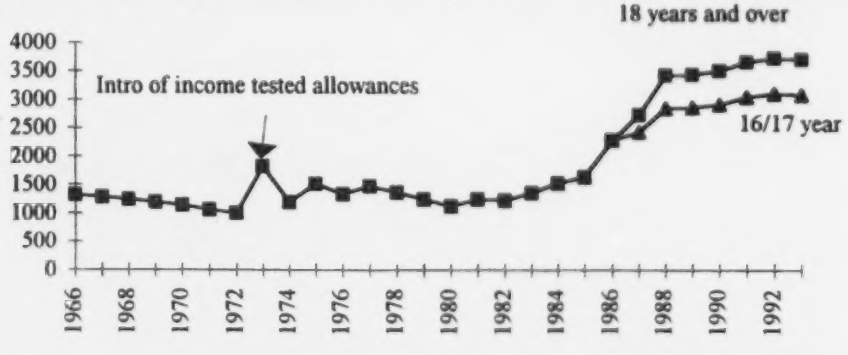
Government allowances

The earliest broadly based government income support, the Commonwealth Secondary Scholarship Scheme, was introduced in 1964 (Chapman, 1992). Awards under this scheme were distributed to students in their final two years of school on the basis of performance in Commonwealth Secondary Scholarship Examinations. In 1973 an additional means tested allowance was provided to low income families and the scheme became known as the Commonwealth Senior Secondary Scholarship Scheme. The Secondary Allowance Scheme (SAS) replaced this scheme in 1974. This scheme provided a non-taxable, non-competitive allowance paid to parents who satisfied an income test. In 1986 SAS was merged with two other schemes (the Adult Secondary Allowance Scheme and the Tertiary Education Allowance Scheme) under the umbrella of AUSTUDY. At the same time rates were increased and payments were made directly to students.

One of the difficulties of assessing the influence of these schemes on school participation is that they provide different incentives depending on the characteristics of the individual. However, if they have any effect it is likely to be on students from the most disadvantaged groups for whom additional income support is important. On this basis, the maximum allowance paid would appear to be the most relevant parameter although not all individuals would receive it.

Figure 9 shows the real value of the maximum amount under these schemes since 1966. While the allowance increased in the 1980s it would appear to be unlikely that the increase in progression rates can be attributed to it. The increase in school retention both preceded the increases that occurred in 1986 and continued to occur after 1988 when the major increase in the allowance ceased. Chapman (1992, page 66), in his review of the AUSTUDY program argues: '...there is no strong evidence for the view that Australian secondary student income support schemes by themselves had a substantial impact on education participation rates up to 1989-90.'

Figure 9: Value of government secondary school allowances (1990 dollars)



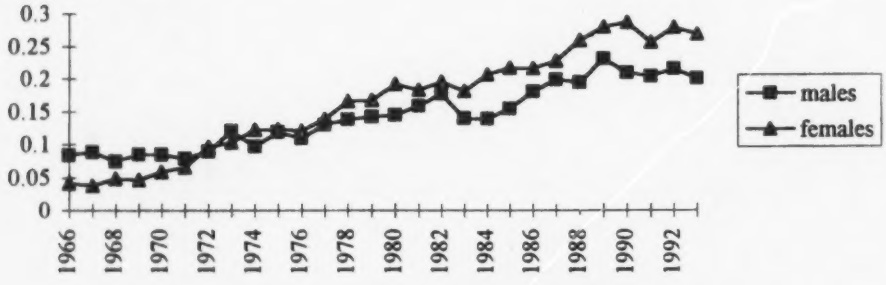
Source: data supplied by the Department of Employment, Education and Training

Part-time work

Another factor which might have affected the attractiveness of remaining at school is the availability of part-time work (Gregory and Duncan, 1980). Figure 10 shows that the proportion of 15-19 year olds at school who were working part-time has increased very substantially since the middle 1960s. The increase began in the early 1970s and has continued more or less ever since. Interestingly, the proportion of females working part-

time was less than the proportion of males at the beginning of the period but the opposite has been true since the late 1970s. Female school retention has followed a similar pattern.[16]

Figure 10: Proportion of 15-19 year olds at school working part-time



Source: Australian Bureau of Statistics, The Labour Force, Australia

A model of grade progression rates

The above discussion has not unearthed any one factor which obviously explains the precise pattern of the increases in grade progression rates we have observed. Factors likely to have had an effect include the cyclical state of the labour market, changes in relative earnings, shifts in demand away from individuals with low levels of schooling, the availability of full-time jobs for teenagers and the level of income support provided to those who continue at school. In this section we bring together these factors more formally. We also include cohort size because of the attention it has received in the literature. We do not include apprenticeship commencements; they showed no long term trend which potentially could explain the changes in retention we have seen while cyclical aspects are already covered.

The dependent variables we use are the apparent grade progression rates from year 10 to year 11 and from year 11 to year 12, respectively, and for males and females separately. This gives us four series each with annual observations from 1968 to 1993. The explanatory variables we consider cover the following areas:

- lagged dependent variables which we take to represent peer influences. If the previous age cohort has a high continuation rate then we would expect this to influence the subsequent year cohort

- cyclical employment opportunities. We use the relevant gender unemployment rate.[17] We also include a change in unemployment rate interacted with its sign. This

[16]Of course the proportion of students working part-time reflects a combination of supply and demand factors. While the increase in the proportion may reflect the availability of work (that is, there has been an increase in the demand for part-time workers) it may also reflect supply factors. It may be the case that students have changed their tastes in respect of working part-time or there has been a change in composition of the student body.

[17]We use the unemployment rates for all males (females) rather than the unemployment rates for teenagers in order to avoid the endogeneity which would be associated with the latter.

allows for the possibility that school retention will increase when the labour market deteriorates but not *vice versa*

- income assistance variables. We use the maximum allowance (for those living at home) for 16 or 17 year olds provided by government and the proportion of teenagers at school in part-time work (separately for males and females)

- long term employment opportunities as represented by the indexes developed earlier in the paper.[18] Progression rates should increase as the index declines

- changes in relative earnings. A decline in the return from having a higher level of educational attainment should lead to a fall in progression rates

- shifts in demand. A shift in labour demand away from persons with low levels of schooling should lead to an increase in progression rates

- cohort size. We follow Wachter and Wascher (1984) and define two indexes. The first is the ratio of the size of younger cohorts to the cohort of 16 (17) year olds and the second is the ratio of the size of older cohorts to the cohort of 16 (17) year olds. This allows the effect of a demographic downswing to be different from that of an upswing.[19]

Time series for the changes in relative earnings and shifts in demand have to be constructed from the relatively few observations derived from the Income Surveys.[20] A further problem encountered in modelling the grade progression rates is that a number of the independent variables are highly correlated. The correlations between the level of demand variable, the teenage employment opportunity index, the proportion of school students working part-time and the maximum student allowance all exceed (absolutely) 0.77 (within males and females, respectively). This makes the coefficients on these variables unstable. This problem of multicollinearity is handled by obtaining the first principal component of the relevant variables, calculated separately for males and

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[18]Specifically, the indexes presented in Figure 7 are used.

[19]The indexes using 16 year olds as a benchmark are used for the grade 10 to 11 progression rate models while the indexes using 17 year olds as benchmarks are used for the grades 11 to 12 models. Closer cohorts are given larger weights according to a quadratic formula. Specifically, the index capturing cohort size of 16 year olds relative to younger cohorts is defined by $(0.11Z_{10} + 0.044Z_{11} + 0.099Z_{12} + 0.176Z_{13} + 0.27Z_{14} + 0.396Z_{15})/Z_{16}$ and the index of cohort size of 17 year olds relative to younger cohorts is equal to $(0.007Z_{10} + 0.029Z_{11} + 0.064Z_{12} + 0.114Z_{13} + 0.179Z_{14} + 0.257Z_{15} + 0.350Z_{16})/Z_{17}$ where Z_i is the population of the cohort aged i years. The indexes reflecting the relative size of older cohorts have symmetric weights. Population series come from Australian Bureau of Statistics, Estimated Age Distribution of the Population, various issues.

[20]First, the observations for all males and all females are used. While it is argued that the experience of 15-24 year olds and 25-34 year olds is more relevant than the experience of older age groups, estimates for the 'total' groups are more stable because they are less prone to sampling error. Second, the Income Surveys have only been conducted six times between 1966 and 1993. We interpolate values for relative earnings by assuming that the relative earnings do not change for the appropriate number of years either side of the survey reference point. We then construct a series by fitting a fifth order polynomial to smooth out the pattern. For the shifts in demand we assume that the growth rates are constant between surveys. The level of demand is then generated by applying these growth rates to a value of one in the base period (1966).

females.[21] Thus changes in the structure of demand, full-time employment opportunities for teenagers and income support are subsumed by one structural variable which represents, in some sense, long term changes in the environment faced by teenagers.

Following Pissarides (1981), Forster and Ryan (1986), Whitfield and Wilson (1991) we use a logistic transformation in order to constrain the predictions under the model to be between 0 and 1. That is, we fit the model

$$p_i = F(\beta' x_i) + \varepsilon_i \qquad (12)$$

where p_i is the proportion of n_i persons who continue from one grade of school to the next in the ith year, F is the logistic function ($F(t)=e^t/(1+e^t)$), x_i is a vector of explanatory variables and e_i is an error term with mean zero and variance $F(\beta' x_i)(1-F(\beta' x_i))/n_i\varepsilon_i$ (Greene, 1993, page 653).

The regression is estimated by transforming (12) to obtain

$$\ln\left(\frac{p_i}{1-p_i}\right) = \beta' x_i + u_i \qquad (13)$$

where u_i has mean zero and variance $/(n_i F(\beta' x_i)(1-F(\beta' x_i)))$.

The results, using weighted least squares, are given in Table 5.[22]

The variables which are significant in all four models are the lagged progression rate and the increase in the unemployment rate. We now discuss the results in detail.

[21]The weights on the standardised variables are all virtually identical.

[22]This is implemented using the *glogit* procedure of Stata version 3.00 (Computing Resource Center, 1992), which uses weighted least squares with weights proportional to $n_i p_i(1-p_i)$ following Theil (1971), pages 632-633). For the purpose of estimation n_i is assumed constant. This effectively treats each proportion as a single observation.

Table 3: Results of logistic regression models of grade progression rates (1969 to 1993)

	Grade 10 to 11 progression rate				Grade 11 to 12 progression rate			
	Males		Females		Males		Females	
	Adj R^2 0.98		Adj R^2 0.99		Adj R^2 0.91		Adj R^2 0.97	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
Lagged progression rate[a]	**4.414**	0.632	**5.436**	1.173	**4.097**	0.837	**5.088**	0.716
Unemployment rate[b]	0.010	0.012	**-0.035**	0.011	-0.020	0.024	-0.023	0.020
Increase in unemployment rate[b]	**0.071**	0.020	**0.069**	0.021	**0.075**	0.029	**0.070**	0.027
Decrease in unemployment rate[a]	0.046	0.043	0.047	0.040	0.044	0.066	0.046	0.050
Structural variables[b,c]	0.039	0.045	0.032	0.075	0.136	0.073	**0.095**	0.044
Relative earnings[b,c]	**1.764**	0.852	0.749	0.821	1.979	1.786	1.009	0.681
Relative size of younger cohorts[c]	0.214	0.566	0.050	0.428	1.517	1.120	0.004	0.547
Relative size of older cohorts[c]	0.398	0.401	0.904	0.491	0.543	0.810	0.426	0.600
Constant	-5.058	1.091	-4.451	1.234	-6.491	2.909	-4.206	1.093
Tests of restrictions								
Unemp. change is symmetric; F(1,16)[d]	0.21		0.17		0.14		0.14	
Cohort effect is symmetric; F(1,16)[d]	0.07		1.60		0.67		0.26	
Cohort effect is zero; F(2,16)[e]	0.57		1.72		0.97		0.25	
Chow test F(9,7)[f]	3.456		4.31		3.31		1.70	

(a) This variable is the lagged progression rate, not the lag of the log odds ratio. (b) Defined by gender. (c) Defined by age. (d) The 5 per cent significance level is 4.49. (e) The 5 per cent significance levels is 3.63. (f) The 5 per cent significance levels is 3.68. Bold coefficients are significant at the 5 per cent level.

Cyclical variables

The importance of the unemployment rate in influencing school retention is not surprising. It certainly has been a popular view that high rates of unemployment have been an important factor behind recent increases in school retention and a number of authors have found 'discouraged worker' effects.[23] Merrilees (1981), Mattila (1982), Raffe (1987), Raffe and Willms (1989) all find that the state of the labour market affect school retention. Our results suggest that the changes in the labour market may have an asymmetric effect, with downturns having a larger effect than upturns. Although the test of equality of coefficients on the increase and decrease in unemployment is accepted, the increase coefficient is significant while the decrease coefficient is insignificant in each equation. Additionally, in each equation the point estimates are larger for an increase

[23]There was a contrary view around in the early 1980s which held that poor labour market conditions led to a fall in school retention. For example, the Commonwealth Tertiary Education Commission (1982) put forward the proposition that high levels of unemployment encouraged the more able students to leave school to search for a job.

than for a decrease.[24] This finding, together with the importance of the lagged dependent variable suggests that school retention of a cohort is dependent on the experience of earlier cohorts. Consequently, grade progression rates tend to ratchet up. A reason behind this may be the social environment at the time which saw education as being 'a good thing'. Chapman (1992) refers to a range of government policies, specifically as set out in *Priority One* (Office of Youth Affairs, 1986), which were aimed at lifting the proportions of teenagers staying at school. Another possible reason is that employers may use schooling as a screen, in which case cohorts would be disadvantaged if they have schooling levels lower than those preceding them.

Structural variables

The structural variables are positive in all models but significant in only the year 11 to 12 models.[25] It is difficult to interpret this variable since it is a composite of highly correlated variables.[26] All that we can really say is that there have been important changes in the environment faced by teenagers and that these changes been conducive to increases in school retention. We have identified a number of these changes (a decrease in full-time employment opportunities for teenagers, a shift in labour demand away from individuals with low levels of education, an increase in the availability of part-time work and increases in government allowances) but it is not possible to say which of these have been more important or whether there are other long term changes which we have not identified. Chapman (1992) suggests that increased education levels of parents may have encouraged participation in education by their children.[27] Permanent income, as measured by per capita private consumption expenditure, has also been increasing steadily over the 1970s and 1980s apart from cyclical slowdowns.

Relative earnings

The relative earnings variable we tested is the relative earnings of individuals, depending on whether they left school or not at year 10 (the year 10 to year 11 model) or year 11 (the year 11 to year 12 model). The coefficients on these variables are all positive, as would be expected, but prove to be significant only in one of the models. While a number of authors have found that the expected return to education is a determinant of school retention (Pissarides, 1981; Mattila, 1982; Whitfield and Wilson, 1991) it is not surprising that our results are weak. The method of construction of the data series and its limited variability make it unlikely that we would find that changes in relative earnings are an important factor.

Cohort size

The coefficients on the cohort size variables are all positive but all insignificant. The joint effect is also insignificant. Falaris and Peters (1992) note that the patterns observed in the United States are more complex than predicted by theory and that short term timing considerations seem to be dominated by more long term factors. Flinn(1993) also

[24]A positive sign on the decrease in the unemployment rate is expected because decreases enter with a negative sign.

[25]The coefficient for the male year 11 to year 12 model is significant at the 95 per cent level based on a one tailed test.

[26]In fact a simple time trend fits the data as well as the constructed variable in a number of the models.

[27]Analysis from the Youth in Transition study suggests that this effect may not be very large (see Vella and Karmel, 1993). Changes in background characteristics, including parental education, play little part in the increased education levels of person born in 1970 compared to those born in 1961.

finds that the response of schooling to cohort size is small.[28] Given these overseas findings it is not surprising that we find cohort size to be an unimportant factor behind the large increases in retention that we have seen.[29]

While the results of the regressions appear quite sensible, the models may not be particularly robust. A Chow test is used to test for stability over time (Greene, 1993, page 211). The data are broken into the periods 1969 to 1981 and 1982 to 1993. This split is natural both because it results in equal sample sizes (almost) and captures the changes apparent from a casual inspection of the grade progression series (Figures 2 and 3). The null hypothesis of no structural break is accepted in three out of four of the models at the five per cent significance level.[30] However, at the 99 per cent level the null hypothesis is accepted in all of the models.

As a final comment is worth considering what the models imply for future school completion rates. The models suggest that there is little likelihood of the grade progression rates declining substantially. While there is nothing in the models to prevent the rates declining to an equilibrium level the structure of the models indicates that it is more likely that retention rates will tend to go up rather than down. There are two reasons for this. First, the asymmetric effect of unemployment; we do not expect a reduction in unemployment to result in a drop in school retention as large as the increase caused by the rises in unemployment. Second, there is no reason to believe that the trends observed in the environment faced by teenagers as measured by the structural variables are likely to change.[31]

Conclusion

In this paper we have compiled a range of evidence of possible economic influences on the demand for the final years of secondary school education. The broad conclusion is that a large number of economic factors have tended to drive school retention up.

The factors can be divided into three broad areas. First, the structure of labour demand has changed in a way which encourages school retention. The demand for persons with low levels of educational attainment has declined, as has the full-time employment opportunities for teenagers.

Second, the increase in government student allowances in the mid 1980s and the long-term increase in the availability of part-time jobs for students has encouraged school retention by reducing the cost of staying at school for part of the student group.

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[28]Flinn develops a perfect-foresight overlapping generation equilibrium model which is calibrated to changes in cohort size between 1920 and 1970 in the United States.

[29]Forster and Ryan (1986), employing a joint time series cross-section approach (with observations for each Australian State) find significant cohort effects for the relatively short period 1968-83. However, their results differ from those found in the United States and also are not consistent across age groups.

[30]The test statistic was obtained by interacting all the variables with a dummy variable taking the value zero up to 1981 and one thereafter, and testing whether the nine interactions were jointly significant.

[31]Figure 3.1 shows that the apparent year 12 retention rate peaked in 1992. Recent data (not included in the regression analysis) indicates a further fall in 1994 to 74.6 per cent from 76.6 in 1993 and 77.1 in 1992 (Australian Bureau of Statistics, 1995).

Third, the increase in the level of unemployment appears to have played an important role in the increases in retention during the 1980s. This is to be expected because the opportunity cost of staying at school will be reduced by increases in the probability of being unemployed. However, improvements in the labour market do not appear to have had the opposite effect. Indeed, the structure of a model of grade progression rates suggests that once the rates go up it is difficult for them to go down. This could be a result of individuals 'following the herd', perhaps because employers use schooling as a screen, and increasing pressure on individuals from parents and governments to complete secondary school.

It also appears that school retention is unlikely to fall significantly in the future. This is because a reduction in unemployment has a smaller effect on retention than an increase in unemployment and there is no reason to believe that the trends observed in the economic environment faced by teenagers are likely to be reversed.

References

Alsalam, N. (1985a), *The effect of cohort size on earnings, an examination of substitution relationships*, University of Rochester Center for Economic Research Working Paper No. 21

Alsalam, N. (1985b), *The dynamic behaviour of college enrollment rates: the effect of baby booms and busts*, University of Rochester Center for Economic Research Working Paper No. 23

Berger, M. C. (1983), 'Changes in labor force composition and male earnings: a production appoach', *Journal of Human Resources* 18, 177-196

Berger, M. C. (1985), 'The effect of cohort size on earnings growth: a reconsideration of the evidence', *Journal of Political Economy* 93, 561-573

Berger, M. C. (1989), 'Demographic cycles, cohort size, and earnings', *Demography* 26, 311-321

Bloom, D. E., R. B. Freeman and S. D. Korenman (1987), 'Labour market conseqences of generational crowding', *European Journal of Population* 3, 131-176

Bureau of Labour Market Research (1987), *Structural Change and the Labour Market*, Research Report No. 11, Australian Government Publishing Service, Canberra

Chapman, B. (1992), *AUSTUDY: A Review; Draft Options Paper*, Centre for Economic Policy Research, Research School of Social Sciences, Australian National University

Commonwealth Tertiary Education Commission (1982), *Learning and Earning: a study of education and employment opportunities for young people*, Australian Government Publishing Service, Canberra

Computing Resource Center (1992), Stata Reference Manual: Release 3. 5th ed. Santa Monica, CA

Connelly, R. (1986), 'A framework for analyzing the impact of cohort size on education and labor earnings', *The Journal of Human Resources* 21, 543-562

Dooley, M. D. and P. Gottschalk (1984), 'Earnings inequality among males in the United States: trends and the effect of labor force growth', *Journal of Political Economy* 92, 59-89

Ermisch, J. (1988), 'Fortunes of birth: the impact of generation size on the relative earnings of young men', *Scottish Journal of Political Economy* 35, 266-282

Falaris, E. M. and H. E. Peters (1991), 'Leveling the peaks and troughs of the demographic cycle: an application to school enrollment rates: a comment', *The Review of Economics and Statistics* 73, 572-575

Falaris, E. M. and H. E. Peters (1992), 'Schooling choices and demographic cycles', *The Journal of Human Resources* 27, 551-574

Flinn, C. J. (1993), 'Cohort size and schooling choice', *Journal of Population Economics* 6, 31-55

Forster, J. H. and C. A. Ryan (1986), *Secondary education retention rates and the youth labour market*, Bureau of Labour Market Research Working Paper No. 65

Freeman, R. B. (1979), 'The effect of demographic factors on age-earnings profiles', *Journal of Human Resources* 14, 289-318

Godfrey, L. (1978), 'Testing against autoregressive and moving average error models when the regressors include lagged dependent variables', *Econometrica* 46, 1293-1302

Greene, W. H. (1993), *Econometric Analysis* (second edition), Macmillan, Publishing company, New York

Gregory, R. G. and R. C. Duncan (1980), 'High teenage unemployment: the role of atypical labour supply behaviour', *The Economic Record* 56, 316-330

Katz, L. F. and K. M. Murphy (1992), 'Change in Relative Wages, 1963-1987: Supply and Demand Factors', *The Quarterly Journal of Economics* 107, 35-78

Mattila, J. P. (1982), 'Determinants of male school enrollments : a time series analysis', *The Review of Economics and Statistics* 84, 242-251

McGavin, P. A. (1982), .School participation of Australians aged sixteen: an analysis of youth unemployment', *The Economic Record* 57, 379-381

Merrilees, W. J. (1981), 'The effect of labour market conditions on school enrolment rates', *Australian Economic Review* 3/81, 56-60

Office of Youth Affairs (1986), *Priority One: The essential features*, Australian Government Publishing Service

Pissarides, C. A. (1981), 'Staying-on at school in England and Wales', *Economica* 48, 345-363

Raffe, D. (1987), 'Youth unemployment in the United Kingdom 1979-84' in Brown, P. and D. N. Ashton (eds) *Education, unemployment and labour markets*, Basingstoke: Falmer

Raffe, D. and J. D. Willms (1989), 'Schooling the discouraged worker: local-labour market effects on educational participation', *Sociology* 23, 559-581

Stapleton, D. C. and D. J. Young (1988), 'Career choice and population growth', *Journal of Labor Economics* 6, 330-362

Sweet, R. (1992), *Bridging the youth productivity gap- a background paper prepared for a national meeting on youth training and employment*, Dusseldorp Skills Forum, Canberra

Theil, H. (1971), *Principals of econometrics*, New York, John Wiley and Sons

Wachter, M. L. and W. L. Wascher (1984), 'Leveling the peaks and troughs in the demographic cycle: an application to school enrollment rates', *The Review of Economics and Statistics* 66, 208-215

Wachter, M. L. and W. L. Wascher (1991), 'Leveling the peaks and troughs in the demographic cycle: an application to school enrollment rates: a reply', *The Review of Economics and Statistics* 73, 575-576

Welch, F. (1979), 'Effects of cohort size on earnings: the baby boom babies' financial bust', *Journal of Political Economy* 87, S65-S97

Whitfield, K. and R. A. Wilson (1991), 'Staying on in full-time education: the educational participation rate of 16 year olds', *Economica* 58, 391-404

Data sources

School retention and grade progression data

Department of Employment, Education and Training (1993), Retention and participation in Australian schools, 1967 to 1992, Australian Government Publishing Service

Department of Employment, Education and Training (1994), Retention and participation in Australian schools in 1993

Australian Bureau of Statistics (1995), *Schools, Australia, Preliminary*, cat. no. 4220.0

Income Survey Data:

1968-69: Income Distribution, Consolidated and Revised Edition, Australian Bureau of Statistics, cat. no. 6505.0

1973-74: Income Distribution, Australian Bureau of Statistics, cat. no. 6502.0

1978-79: Income Distribution, Australia, Individuals, Australian Bureau of Statistics, cat. no. 6502.0

1981-82: Social Indicators No. 4, 1984, Australian Bureau of Statistics, cat. no. 4101.0

1985-86: Income Distribution Survey, Persons with Earned Income. Australia, cat. no. 6546.0

1989-90: Survey of Income and Housing costs and Amenities, Persons with Earned Income. Australia, Australian Bureau of Statistics, cat. no. 6546.0

Labour force status and educational attainment

Australian Bureau of Statistics, Labour Force Status and Educational Attainment (cat. no. 6235.0)

Occupational employment data

Australian Bureau of Statistics, The Labour Force, Australia (various publications including microfiche)

Cohort population data

Australian Bureau of Statistics, Estimated Resident Population (various publications)

Apprenticeship commencements

National Centre for Vocational Education Research Ltd, Annual Apprenticeship Statistics

Government secondary school allowances

Data supplied by the Department of Employment, Education and Training

Publications and reports: 1995 and 1996 (April)

Anderson, D. (1995), Private Training in Australia, an Overview of Recent Research, *The Economics of Education and Training 1995* edited by F Ferrier and C Selby Smith, AGPS, Canberra, 1-14.

Anderson, D. (1995), *Are you being served? Client perspectives on student services and amenities in TAFE, Report to the National TAFE Chief Executives' Committee*, ESSSC, 1995.

Anderson, D. and Kempsey, K. (1995), *Building a Training Culture: Towards an Education and Training Strategy for the Victorian Social Housing Sector*, VCOSS Social Housing Paper No 4.

Anderson, D. and Powles, M, (1995), Participation and access in TAFE: economic utility or social service?', *CSHE Research Working Paper*, Centre for the Study of Higher Education, University of Melbourne.

Burke, G. (1995), Dimensions of Education and Training, Australia from 1988, *The Demand for and Dimensions of Education and Training*, NBEET, Commissioned Report No 39, AGPS, Canberra, ppi-ix, 1- 46.

Burke, G (1995), Some Aspects of the Economic Evaluation of VET, *The Economics of Education and Training 1995* edited by F Ferrier and C Selby Smith, AGPS, Canberra, 35-44.

Burke, G.(1995), Decomposition of Education Expenditure in Australia; Government Schools *The Economics of Education and Training 1995* 113-23.

Burke, G (1995), Coments on Bob Gregory' paper, *Efficiency and Equity in Education Policy*, NBEET and CEPR Conference Canberra, September

Ferrier, F. (1995), Two Steps Forward, One Step Back? Equity and VET Reform, *The Economics of Education and Training 1995*, 49-59.

Ferrier, F. and Selby Smith, C. (1995), *Economics of Education and Training 1995*, AGPS Canberra

McKenzie, P. (1995), *Personnel and Financial Resources Allocated to Educational R&D in Nine OECD Countries*, American Educational Research Association Annual Conference, San Francisco, April.

McKenzie, P. (1995), Transitions Between Education, Training and Work, 188-97, *The Economics of Education and Training 1995*, AGPS, Canberra.

McKenzie, P. (1995) Scale Economies in Australian Secondary Schools *Australian Journal of Education*, 39(2), 109-125.

McKenzie, P. (1995) Cooperation in Education Research *Australian Alternatives*, 4, 4, 11.

McKenzie, P. and Long, M. (1995) Educational Attainment and Participation in Training., *Efficiency and Equity in Education Policy*, NBEET and CEPR Conference Canberra, September.

McKenzie, P., Roberts, D., Shah, C. and Burke, G. (1995) *Student Enrolment Projection Models*, Report to the Directorate of School Education, ACER, Melbourne (mimeo).

Maglen, L. (1995), The Role of Education and Training in the Economy, *Australian Economic Review 2'95, 128-47*

Maglen, L. and Selby Smith, C. (1995), *Pricing Options*, A Report to the New South Wales TAFE Commission, May 1995.

Maglen, L. and Chris Selby Smith, (1995) Pricing Options in NSW TAFE *The Economics of Education and Training 1995, 70-80.*

Selby Smith C. & Fran Ferrier (1995) , The economics of VET in Australia: a review, *The Economics of Education and Training 1995,* 81-96.

1996

Burke, G (1996) School Resources, invited paper for the *Australian Economic Review.*

Burke, G., McKenzie, P. and Grauze, A. (1996) *Review of Statistical Data for Research on VET,* prepared for a Working Group established by the ANTA Research Advisory Council March. Pp x1+89.

Shah, C.and Burke, G. (1996), *Student Flows in Higher Education*, Report prepared under the DEET EIP program April 1996.

Teicher, J. and Grauze, A. (1996), Enterprise Bargaining, Industrial Relations and Training Reforms in Australia, *Australian Bulletin of Labour* March, 22, 1, 59-80.

Working Papers

Karmel, T. (1996), The Demand for Secondary Schooling. Working Paper No. 3.

Maglen, L. and Selby Smith, C. (1995), *Pricing Options*, A Report to the New South Wales TAFE Commission, May , Working Paper No 1.

Maglen, L. (1995), The Role of Education and Training in the Economy, September Working Paper No 2.

McKenzie, P and Long, M. (1995) Educational Attainment and Participation in Training, NBEET ANU Conference 6-7 September, Working Paper No 4.

Annual Book: *Economics of Education and Training 1995*
(Edited by F Ferrier and C Selby Smith, published by AGPS for the Centre September 1995)

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